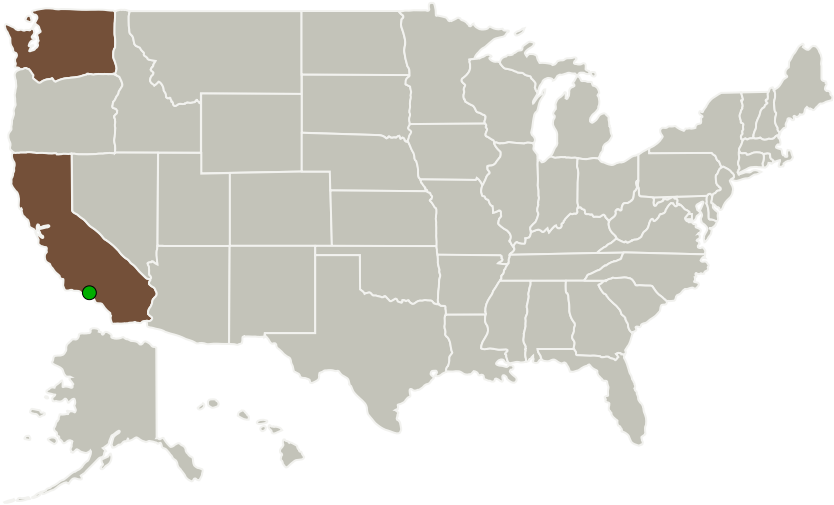
Large-Area, Atmospheric Pressure Plasma Jet for Spacecraft Surface Sterilization for Planetary Protection, Phase I

Completed Technology Project (2016 - 2016)

Project Introduction

The planetary science community is interested in exploring solar system bodies with the potential for life detection, which requires technologies that implement Contamination Control for Planetary Protection. Currently, the only approved full-system microbial reduction method is dry heat microbial reduction, which requires heating of the spacecraft to high temperature for a fixed length of time at a specific humidity. While this technique is practical and effective, some state-of-the-art electronics and other thermally sensitive components make this technique unusable for certain materials. One potential alternative technique for surface sterilization of a fully assembled spacecraft or components is the use of atmospheric pressure plasma jet (APPJ), which has been an area of investigation within the biomedical community. The APPJ has the advantage that the plasma is ejected from a device (up to several centimeters) and travels to the surface to be sterilized. Eagle Harbor Technologies (EHT), Inc. is proposing to develop a large-area APPJ for spacecraft surface sterilization. EHT will leverage the previously developed EHT nanosecond pulser, which provides unprecedented control of output voltage, pulse width, and pulse repetition frequency. This capability will allow EHT researchers to develop and optimize an APPJ for surface sterilization.

Primary U.S. Work Locations and Key Partners



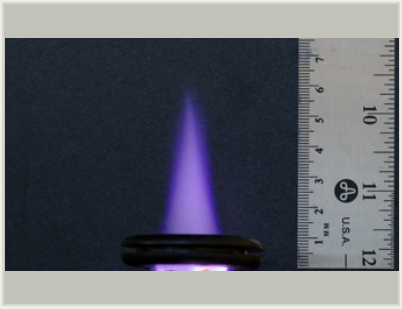


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Eagle Harbor Technologies, Inc.	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Seattle, Washington
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Washington

Project Transitions

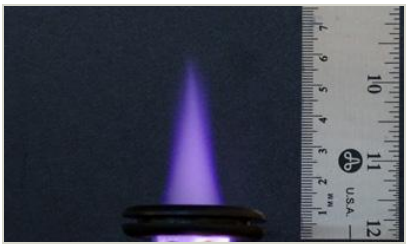
June 2016: Project Start

December 2016: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139762)*

Images



Briefing Chart Image
Large-Area, Atmospheric Pressure Plasma Jet for Spacecraft Surface Sterilization for Planetary Protection, Phase I *(https://techport.nasa.gov/image/129457)*

Final Summary Chart Image
Large-Area, Atmospheric Pressure Plasma Jet for Spacecraft Surface Sterilization for Planetary Protection, Phase I Project Image *(https://techport.nasa.gov/image/130377)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Eagle Harbor Technologies, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

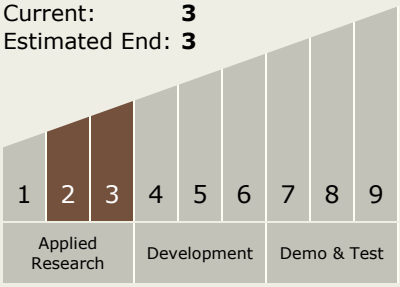
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
James Prager

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.3 Mission Operations and Safety
    - TX07.3.5 Planetary Protection

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System